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ABSTRACT

This paper describes a project for the development of instructional and assessments systems to increase user-proficiency levels for the software created by WordPerfect Corporation. The project was part of an effort by WordPerfect and the Institute for Computer Uses in Education/Evaluation to create and establish standards of proficiency in the use of WordPerfect. The project included development of two computer-administered high-stakes assessments for use in the United States and Canada, a training kit for Authorized Training Center instructors, and a student training kit for self-paced or group instruction. All of these products were developed for WordPerfect Office 4.0 software. The work-model approach, which was used to develop the performance-based documentation, is described. Work models, when developed correctly, represent the common general features of a job and the relationships between these features on which experts agree. The work models, taken together, provide a structure that describes the knowledge and performance capabilities of an experienced WordPerfect Office 4.0 system administrator, and consequently allows the construction of the tests and documentation. Three figures illustrate the development process. (Contains 7 references.) (SLD)

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Utilizing Work Models to Develop Performance-based Documentation in a Learning Progress System

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ED 372 109

The Project and the Products

This paper describes a project for the development of instructional and assessments systems created to increase the user level of proficiency of software created by WordPerfect Corporation. Each product in this project was created as part of the effort by WordPerfect and the Institute for Computer Uses in Education/Evaluation (ICUE) to create and establish standards of proficiency in the use of WordPerfect products and expand the WordPerfect Support base throughout the world. ICUE was commissioned to assist WordPerfect in the multiple stages of development of a learning progress system with documentation and a hypertext infobase.

This project included the development of two computer-administered high stakes assessments to be delivered throughout the United States and Canada, a training kit for Authorized Training Center instructors, and a student training kit to be used in self-paced or group instruction. The instructor kit included lesson plans and visuals for lesson presentations. The student training kit included a paper-based lesson guide and an electronic hypertext infobase.

These products were developed for the WP Office 4.0 software. WP Office 4.0 is an electronic mail and scheduling system which is installed over a network. The target audience of these training materials were the system administrators who plan and install these systems, keep them running, and troubleshoot problems in the system, rather than the end user of the WP Office 4.0 e-mail and scheduling capabilities.

A high emphasis was placed on developing performance-based products. The work model approach (Bunderson, Gibbons, Olsen & Kearsley, 1981; Bunderson, Ford, Olsen, Cho & Omori, 1994) was used to accomplish this in the development of each of these products. The intent of this paper is to describe the work model approach as it has been applied to developing performance-based documentation in a learning progress system.

Work Model Theory

Rather than using objectives to describe the work that is done, we chose to use another way to represent and organize work- the work model approach. The following paragraphs describe the work model approach to creating performance-based documentation as it compares to approaches that use behavioral objectives, and discuss strengths and weaknesses that are unique to the work model approach.

The intended result of creating performance-based documentation is helping the learner to think about and learn the performance in terms of the performance rather than in terms not so directly tied to the performance. Thus, someone who can do the job completely and accurately is essential to the creation of performance-based documentation. Interviews, focus groups, observations, and surveys can be used to elicit from this expert, or ideally several experts, information regarding the nature of the job. Experts drive this process by describing the types of physical and mental tasks that they do.

It is very difficult to create a description of a person's mental and physical performance that communicates clearly and is complete and accurate. Often times if you ask an expert to tell you

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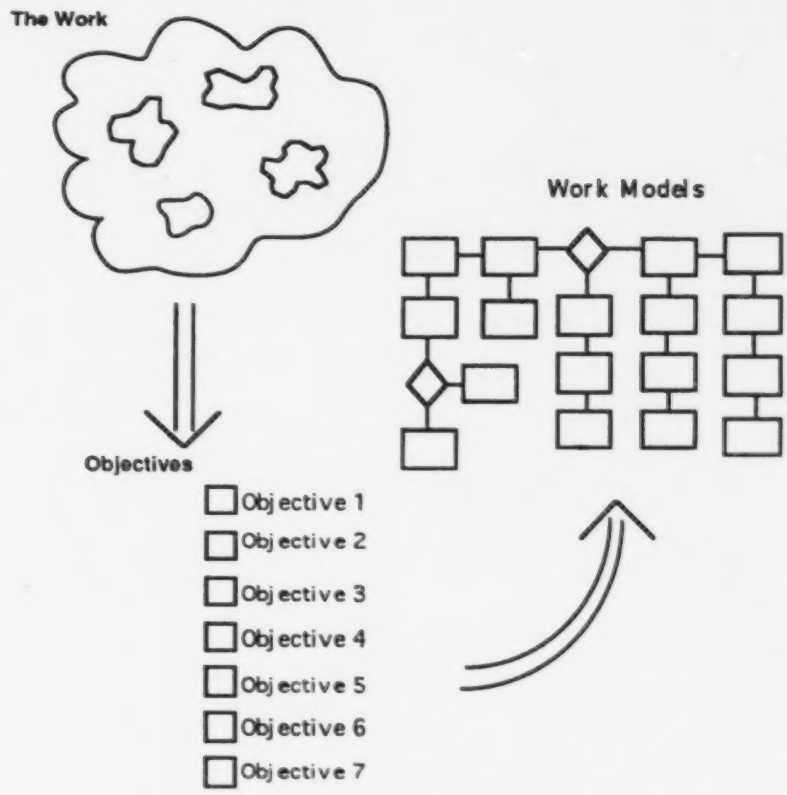


Figure 1

about how to do their job, the result is a very ambiguous picture of what they might do. (See top of Figure 1.) A common approach to making the job that an expert performs more easily communicated is the objectives approach. (See the bottom left of Figure 1)

When using the objectives approach for describing performances, the resulting description of the performance is normally a very clear list of verbal statements about the job. As the objectives approach dictates, each statement in the list should clearly communicate a bit or piece of the overall performance, whether it is a performance taking place in the mind or a physical performance.

Often when objectives are used in instructional documentation the items in this list of descriptive behaviors for a distinct part of the work, are distributed across chapters of material, and the subset of tasks which once described a single performance become disconnected, out of context, and stand alone as performances themselves. This organization for the content of documentation thus requires that the user be proficient in putting the pieces back together so that the performance is as natural and authentic as it was with the expert. This requirement of re-assembling of the context and relationships between tasks and behaviors can present a challenge to the users of such materials.

If users fail to reassemble these isolated components into a task structure, then their understanding of the performance of their software-related job will be disconnected and

fragmentary. Perhaps worse, if they do integrate these components into models of tasks and their reassembly of these isolated components does not match that of experienced experts, then their understanding of their job will be incorrect and incomplete.

Most jobs can be seen as a series or sequence of tasks. When using work models we seek to create a representation of the work that preserves the relationship between those tasks which is seen by the expert. (See right side of Figure 1.) This representation may illustrate a sequential relationship of the tasks in the job or it may be some other relationship, but the experts can help you identify a representation that communicates well. It is important that the representation be one which experts agree upon is a valid representation of the work, and one which communicates easily to the intended audience. This representation can be very valuable in training by providing a "big picture" of the work which novices may not see without them (Stepich, 1991).

The benefit of using work models in performance-based documentation is the structure that they bring into the description of the work that an expert does. Without the structure of work models, the work that an expert does remains ambiguous to a learner. And if a learner were to attempt to gather information about how to do the job from a number of individual experts and compare what each expert described, the learner would find the work to be somewhat idiosyncratic as well. Work models, when developed correctly and well, represent the common general features of the job and a relationship between those features that experts agree upon.

Work models also contain objective like statements, or elements, of the more specific tasks that are performed as part of a particular work model. These elements provide clarity and completeness to the description of the job. Work models improve the user's understanding of each of the elements by adding a structure which shows how the elements relate to each other.

However, there is at least one weakness in using work models. This weakness is that when structure is imposed upon the natural, authentic job something about the job will not fit into that structure and thus the job description leaves some things out. This is true of the work model approach. By the nature of its utility the work model representation must be a simplified and regularized version of what the real job is. An inherent part of the methodology for developing work models is that the work models must allow for the inclusion of a majority of the job at the level of expertise that it is being described. In this project the utility of work models outweighed the fact that every aspect of the job may not fit cleanly into the best representation for the job.

The Development Process

The task analysis or "knowledge acquisition" process which led to the development of the work models and the description of the job, utilized a series of group and individual interviews, and focus groups with people who had extensive experience with the software (subject matter experts or SMEs). Many of these people rated themselves and were rated by their supervisors to be experts at using the software in their daily jobs.

The development of a high level work model structure was achieved during initial stages of the knowledge acquisition phase of the project. After analyzing existing documentation and conducting a few initial interviews with some SMEs, attempts to synthesize the information gathered into a coherent representation of the job led to the high level work model structure illustrated in Figure 2. This diagram illustrates a sequential relationship of work models across the top of the diagram- planning, installing, maintaining and troubleshooting- and a hierarchical relationship on the side- the smallest type of WP Office 4.0 configuration on the bottom and the largest type on the top. One work model in this situation is described in each box. Thus, the intersection Multiple Domain- Planning is one work model.

	PLAN	INSTALL	MAINT	TSHOOT
Multiple Domain				
Mult. P.O./ Single Domain				
Single P.O./ Single Domain				

Figure 2

The details for each work model were worked out through a cyclical synthesis of information gathered from SMEs. Interviews with SMEs provided information then we would attempt to synthesize the information into work models. The experts helped us more completely describe the job by talking about tasks they perform and also about additional knowledge and understanding they had of how the software performed. Later, experts would evaluate our representations and provide feedback. Each expert interview or focus group led to a more congruent and complete description of the job. A particular goal of this task synthesis was to "fill the holes" in our job description that were not described in the WP Office product documentation. Another goal was to have SMEs describe common errors that people make that they had encountered. This type of information helped the description of the job to be more complete.

The result of this information gathering process was a detailed job description organized by work models and made up of hundreds of objective like statements or elements and many diagrams used to illustrate the sequence of work. This work model structure was carried through to provide an organizing framework for the documentation.

Each lesson in the documentation contained six sections: a Scenario, Know How, How To, Detailed Directions, Give Me More Detail, and Practice (See Figure 3). These sections were adapted from research done on the relationship of learning styles and the presentation style of the content (Guymon, 1989; Guymon, 1987). The Scenario provides a context for the knowledge and skills being learned. The Know How section provides background information for the learner to acquire about the software. The How To section provides a brief summary of the tasks that need performed and is intended to meet the needs of holistic learners. The Detailed Directions section provides serial learners step by step guidance through the job elements in the work model. The Give Me More Detail is a diagram of what activities the software performs when the system administrator performs a task, and the Practice section allows the learner to practice again specific tasks in the context of that work model.

The SMEs were responsible for writing the Know How and Practice Questions sections of the lessons contained in the documentation. The Know How section provides users with background information about the software so that they will be able to perform the tasks described in the General Directions and Give Me More Detail sections. This was very useful because the experts were accustomed to communicating to an audience which knew something but not everything about this domain of skills and knowledge, due to their experience as telephone support operators. They were also very good at creating appropriate problems for each work model because of their extensive experience troubleshooting problems. SMEs also took responsibility for double checking our descriptions of procedures contained in the "How To" section.

The instructional development team worked on the remaining sections and was responsible for checking the SME's writing for clarity of word choice, spelling, grammar, checking the

problems for appropriate structure and double checking content, as well as formatting the documents and creating and inserting graphics. This was proved to be an efficient process for the SMEs because it allowed them to concentrate on effectively communicating their knowledge and skill.

Single Post Office/Single Domain INSTALLATION

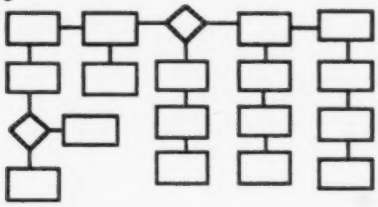
Scenario

The Red Ink Pen Co. has one file server and 16 users.

Know How

When you create a user on a post office, NUSER.EXE creates a new user database in the po/user/ml directory and in the domain/domain.db/user directory.

How To

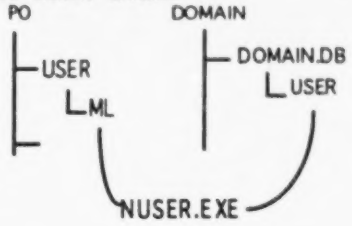


When you create a single post office system you must first create the post office and then create each user for that post office.

Detail Directions

Step 1 From the CREATE menu choose POST OFFICE
Step 2 Enter the name of the post office and complete the fields in the screen as needed.
Step 3 From the CREATE menu choose USER
Step 4 Enter the user's name and complete the fields on the screen as needed.

Give Me More Detail



Practice

Socilia, Inc. wants to set up e-mail for its seven employees. Create a single post office/single domain system for this company.

Figure 3

It was also appropriate to have editors who were not experts, but understood something about the work of a WP Office 4.0 system administrator, check the work of experts. On one hand the editors could double check to be sure we were communicating to a less knowledgeable audience. On the other hand, editors who did not know about the domain of knowledge and skill

could not be sure the right information was being communicated and was not as skillful in identifying extraneous ideas the SMEs might include in their writing.

The set of work models taken together provide a structure that completely describes the knowledge and performance capabilities of an experienced WP Office 4.0 system administrator. This allows the development of a certification test, a practice test, a study support hypertext infobase, and performance-based documentation described in this paper which are aligned together using the same organization of the content.

Future Directions

The work that WP Office 4.o system administrator performs is highly procedural and it has been very useful to describe these procedures using work models. A direction for further study of the utility of work models in creating and organizing instructional documentation is in the domain of knowledge and skills where the content is not strictly procedural. Although the results of this study might be grim for work models, such an endeavor would certainly give us new ideas about how to organize instructional content.

It would also be of interest to compare the degree of comprehension of the content by users of documentation which employed work models with the comprehension of users that studied other types of documentation. This study might help us gain a better grasp on the real utility of work models in procedural type training and also assessment.

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